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SEA MUSSELS

A Potential Source of Attractive Low-Cost Sea Food from the Atlantic Coast 1/

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For the past six months or more the American public has been learning that it can not eat money. No matter what your bank balance may be, you may experience food shortages for there is only so much sugar, coffee, tea, and even meat. Fish has become costlier and harder to get, and our old stand-bys, canned salmon and tuna, are notable by their absence from the grocers' shelves.

In view of this growing scarcity, any new source of supply that can be harvested with present equipment and manpower is doubly valuable. The sea mussel (Mytilus edulis), found along the North Atlantic coast, is such a source. It is an excellent article of diet, either steamed, fried, chowdered, or prepared in other ways. It occurs in great quantities along the North Atlantic coast; it can be gathered easily by the use of rowboats or small power boats and with simple fishing gear such as modified clam rakes, tongs, or dredges.

POSSIBILITIES FOR THE INCREASED PRODUCTION OF SEA FOODS

Biologists of the Fish and Wildlife Service have been studying the possibilities of increasing the production of sea foods in the North Atlantic area, and this study has been intensified since December 1941. In this work, active cooperation has been received from State agencies, notably the Massachusetts Department of Marine Fisheries and the Maine Department of Sea and Shore Fisheries, and from commercial organizations.

1/ A general report covering information obtained from a preliminary survey of the possibility of utilizing mussels. Some of the conclusions may be modified later following more extensive studies by the various Service specialists.

At an early date it became obvious that under present conditions, utilizing additional kinds of fishes from the offshore banks offered only limited promise, for the reduction in the fleet of trawlers through transfer to the Navy, left insufficient boats even to maintain normal catches of such standard food species as cod and haddock. Production of inshore fishes is similarly restricted by the boats available, and increase in this fleet is limited by shipyard space and materials. The fisheries least affected are in areas close inshore that can be reached by rowboats and small power boats, and within these areas the sea mussel is the most promising unexploited sea food that exists in abundance.

Mussels are consumed in great quantities in Europe, particularly in France, Holland, and England, and are cultivated in a manner somewhat similar to that used for oysters. However, they have never been used on a large scale in the United States.

In the study here reported upon, mussels were prepared and cooked in a number of ways, and served to a varied group of people. The nearly unanimous opinion rated them as excellent, and mussels canned in either "Pacific" or "Eastern" oyster style when used in chowder, were pronounced superior to the standard-pack canned clams with which they were compared. The canned clams were unselected samples obtained from retail groceries.

To develop a market for large quantities of mussels, it is essential that they be offered in a form that will appeal to the average housewife. They should require little preparation, should be easy to handle, and should keep satisfactorily.

For several reasons, it appears undesirable at present to encourage the marketing of fresh mussels either in the shell or shucked. Without special equipment, fresh mussels can be held for only a short period and there is danger that spoilage of a few shipments might produce bad publicity which would ruin the whole program of development before it could get well under way. It is particularly important that the mussel product be packed to keep for a considerable time, especially during the period of introduction when stocks might remain on hand for some time. The circumstances mentioned above would limit the marketing of fresh mussels to a relatively narrow section along the coast. This area is already supplied with fresh clams and would offer, at best, a very limited outlet for so similar a product as fresh mussels. The very large available supply of mussels makes it desirable, therefore, to develop methods of processing which will adapt the product to a wider market.

Early plans to promote the use of canned mussels for domestic consumption to replace canned salmon, tuna, mackerel, etc., were halted by the shortage of tin and steel for making cans. Consequently, for the duration of the War, and unless additional supplies of tin cans are provided, canned mussels probably will be available only for the

Armed Forces or for Lend-Lease. If this proves true, then some other form of preservation must suffice for the United States public.

In default of canning, probably the most promising method for handling mussels is freezing. This will permit holding them for limited periods to meet a probably variable demand, particularly during the first part of the marketing program. Arrangements were made with the Gorton Pew Company to try out this method and a shipment of mussels was sent to their Gloucester plant where the meats were packed and frozen in paper cups. Prepared in this way, they were found to compare favorably with fresh mussels and a 12-ounce cup provided an amount sufficient to prepare chowder for six people. Frozen mussels from this lot also proved very satisfactory when fried, served in cocktails, or pickled. No information has yet been obtained concerning the effects of long-period storage.

SUGGESTIONS FOR PROSPECTIVE DEALERS

A number of factors must be taken into consideration in preparing mussels as a commercial product. In general, mussels should not be taken from areas bared for any considerable time at low tides. When exposed to the sun for extended periods, particularly during warm weather, some may die and spoil to an extent sufficient to cause distress if they are eaten. It is probable that this is much less likely to occur in fall, winter, and spring than during the summer, but in any event, mussels should not be used unless they are in a healthy, living condition when shucked. Such mussels will hold their shells tightly closed for some time after being disturbed. A good test of the condition of any mussel with a gaping shell, is to observe whether it remains open after the animal is slightly irritated. By using this test the authors found it safe to use mussels taken from above low-tide level, even during hot weather in August, but gathering mussels in these areas is not recommended to the general public.

Frequently, dead shells full of mud remain closed when collected and shipped and have the appearance of live mussels. If they are left with live mussels that are steamed in preparation for canning, freezing, or other use, the liquor, or broth, will be so flavored by the mud that it cannot be used. Preliminary trials indicate that it is desirable to save the liquor for use, if it can be obtained free of the mud flavor.

Mussels from some areas contain numbers of small pearls, most of them not much larger than grains of sand, but some reaching a much larger size. These pearls are of no value and when numerous may be very objectionable to the consumer. Probably, therefore, "pearly" mussels should not be collected for food.

Any commercial fishery for mussels will be affected to a considerable extent by the change that occurs in the meat of the animals after spawning. Field observations showed that the yield in solid meats (drained weight) per bushel of mussels increased from less than 9 pounds in the first week of August to almost 15 pounds by the

middle of September. The yield probably would continue to increase through the late fall and winter and up to the spawning season, in late spring and summer. Since "fat" mussels yield a much higher return in pounds and make a more appetizing item of food, it appears that the fishing season should be limited to the months from September or October to May or June. This season has the added advantage that it would reduce the danger of including dead mussels in the catch—a risk that is greatest during the summer months. The season proposed also coincides, at least in part, with the slack period in the lobster and other predominantly summer fisheries. It also is the time when sea-food canneries are least busy. Consequently, the mussel fishery can be carried on to a large extent by manpower and equipment that is now used in summer fisheries. The principal new materials required will be modified rakes or tongs for shoal, and dredges for deep water.

Table 1, a summary of present information on yields, indicates that there was a considerable increase in weight from August to September for both Massachusetts and Maine mussels and that on comparable dates the Maine mussels yielded a somewhat higher poundage than did those from Massachusetts. However, the sampling was too limited to prove that the yields of Massachusetts mussels in general are less than those from Maine or that there would be similar differences later in

Table 1.--Yields per bushel of mussels

Origin of mussels	Date	Meats 1/	Shell	Juice 2/
		Pounds	Pounds	Pounds
Massachusetts				
Nantucket	Aug. 21, 1942	8.3	20.6	14.6
Orleans	Sept. 4, 1942	8.9	25.3	19.1
Mattapoisett	Sept. 5, 1942	12.4	26.1	7.5
Maine				
Boothbay Harbor	Aug. 8, 1942	10.2	33.4	9.7
do	Aug. 25, 1942	13.4	33.0	12.3
do	Sept. 16, 1942	14.8	33.9	11.7

1/Drained weights obtained by shucking without steaming. If the mussels are steamed open, the meat weights will be reduced.

2/The yield of juice per bushel was highly variable as it depended to a large extent upon the length of time the mussels had been out of water and the conditions under which they were packed and shipped to the laboratory.

the season. The comparison is affected also by the length of the recovery period since the last spawning season in the different areas, for which no data are at present available.

SURVEY OF THE AVAILABLE SUPPLY

Before attempting to develop a large-scale market for mussels, it is desirable to have fairly accurate estimates of the minimum quantities available along different sections of the coast, the areas where pearl-free mussels can be found, the number and size of pearls found in other areas, and the yield per bushel that can be obtained at the various seasons and from different areas. To obtain this information, the Fish and Wildlife Service, working in cooperation with the Maine Department of Sea and Shore Fisheries and the Massachusetts Division of Marine Fisheries, has undertaken a survey of the mussel beds from Maine southward. The greater part of the work will be done on the research boats Skimmer and Phalarope of the Fish and Wildlife Service, which are equipped with hoists, dredges, rakes, and other gear required.

The mussel survey in Maine was begun by Leslie W. Scattergood, in charge of the Service's lobster investigation, while work along the Connecticut coast will be started in the near future by Dr. Victor L. Loosanoff, in charge of the Service's Fishery Biological Laboratory at Milford, Conn. Studies on the life history and propagation of mussels also will be continued by Dr. Loosanoff. The survey has been planned to provide the following information:

1. The location and size of the principal mussel beds.
2. The total contents of the beds in terms of quantity and size of mussels.
3. The yield in pounds of meat per bushel for each area and season.
4. Quantities and sizes of pearls found in mussels taken from each area.
5. Methods for gathering mussels.
6. Information concerning available canning and freezing facilities, boats and manpower.

From information now available, there appears to be every reason to expect that, with the help of a well-planned marketing program, mussels can be used to make up in part for the shortage in the more familiar meat and fish products.